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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **Schmidl et al.**

Serial No.: **09/526,930**

Filed: **03/16/2000**

Docket Number: **TI-30734**

Art Unit: **2611**

Examiner: **K. Kim**

Conf. No.: **1461**

For: **SYSTEM AND METHOD OF COMMUNICATION USING COMBINED SIGNAL PARAMETER DIVERSITY**

CERTIFICATION OF FACSIMILE TRANSMISSION

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Robert N. Rountree (signature)
Robert N. Rountree, Reg. No. 39,347

June 25, 2007
Date

FACSIMILE COVER SHEET

X	FACSIMILE COVER SHEET	___	AMENDMENT (# Pages)
___	NEW APPLICATION	___	EXTENSION OF TIME (# Page)
___	DECLARATION (# Pages)	___	NOTICE OF APPEAL (# Page)
___	ASSIGNMENT (# Pages)	X	APPEAL BRIEF (18 Pages)
___	FORMAL DRAWINGS	___	FEE TRANSMITTAL (# Page)
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___	DIVISIONAL APP'N		

NAME OF INVENTOR(S): *Schmidl et al.*	RECEIPT DATE & SERIAL NO.: **09/526,930**
	FILING DATE: *March 16, 2000*
TITLE OF INVENTION: ***SYSTEM AND METHOD OF COMMUNICATION USING COMBINED SIGNAL PARAMETER DIVERSITY***	
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Serial No.: **09/526,930**
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APPELLANTS' BRIEF

June 25, 2007

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I hereby certify that the above correspondence is being facsimile transmitted to the Patent and Trademark Office on June 25, 2007.

Robert N. Rountree

Robert N. Rountree, Reg. No. 39,347

Dear Sir:

In support of their appeal of the Final Rejection of claims in the above-referenced application, Appellants respectfully submit herein their brief.

1. REAL PARTY IN INTEREST

Texas Instruments Incorporated is the real party in interest.

2. RELATED APPEALS AND INTERFERENCES

No other related appeals or interferences are known to Appellants.

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3. STATUS OF CLAIMS

Claims 12-14, 17-19, and 22 are rejected under 35 U.S.C. § 102(b). Claims 1-4, 6-11, 14-16, 20-21, 28-38, and 40-47 are rejected under 35 U.S.C. § 103(a).

Claims 1-4, 6-22, 28-38, and 40-47 are in the application. Claims 12-14, 17-19, and 22 are rejected under 35 U.S.C. § 102(b). Claims 1-4, 6-11, 14-16, 20-21, 28-38, and 40-47 are rejected under 35 U.S.C. § 103(a). Examiner, in an Office Action of October 16, 2006, made final rejection of claims 1-4, 6-22, 28-38, and 40-47. Examiner reaffirmed the October 16, 2006 rejection in an Advisory Action dated April 25, 2007. Claims 1-4, 6-22, 28-38, and 40-47 are on appeal and are reproduced in the Appendix to Appellants' Brief filed herewith.

4. STATUS OF AMENDMENTS

No amendments were filed after final rejection.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a method of communicating data (Figures 2-3) between a transmitter (102) having plural antennas (208-212) and at least one remote receiver (104-108). Referring to Figure 2, the method includes phase shifting a plurality of data communication signals (232-248) from a respective plurality of channels (202-206) to generate derived versions of each data communication signal. Each derived version of each data communication signal has a respective signal phase shift at the output of each circuit (232-238). The derived versions of each data communication signal are transmitted to respective antennas (208-212). A distinct delay associated with each derived version of each data communication signal and its respective antenna is provided (214-230). The distinct delay associated with a derived version of a data communication signal is altered in response to a change of an estimated path profile (302-306) associated with a channel of the plurality of channels.

Independent claim 8 is also directed to a method for communicating data (Figures 2-3) between a transmitter (102) having plural antennas (208-212) and at least one remote receiver (104-108). Referring to Figure 3, the method includes receiving at the transmitter, data communication uplink signals from each remote receiver in communication with the transmitter and estimating a path profile (302-306) associated with each received uplink signal. A distinct communication signal delay associated with each communication channel within a plurality of communication channels is determined (214-230). Each communication channel signal delay is derived from the estimated path profile of data associated with the respective uplink signal. The transmitter transmits a communication signal via each communication channel to each antenna of the plural antennas. A distinct delay associated with each communication channel and its respective antenna is applied to the respective communication signal. Referring to Figure 2, channel information between the transmitter and the plurality of antennas is measured (256). The channel information is one of signal amplitude, signal phase and signal delay. A desired communication signal phase shift associated with each communication channel from the measured channel information is determined (256). The communication signals are selectively phase shifted (232-248) at the transmitter to generate derived versions of channel communication signals. Each derived version of the channel communication signals has its desired communication signal phase shift.

Independent claim 12 is directed to a communication system having a transmitter (200) with plural spaced apart antennas (208-212). A channel measurement circuit (256) coupled to the plural spaced apart antennas produces a path profile estimate in response to a signal from a remote transmitter (104-108). A channel input terminal (202-206) receives a data communication signal. A delay circuit (214-230) provides a distinct delay in the data communication signal in response to the path profile estimate (302-306).

Independent claim 18 is directed to a data communication system including a transmitter (200) with plural spaced apart antennas (208-212) suitable for communication with at least one remote receiver (104-108). An element (232-248) provides a derived version of each

communication signal transmitted from a transmitter channel to the plural spaced apart antennas. A delay element (214-230) provides a distinct delay associated with each antenna and configured to alter the distinct delay in response to a change of a path profile (302-306) associated with the transmitter channel.

Independent claim 28 is directed to a data communication system (Figure 6). The system includes a transmitter configured to communicate with a remote receiver (104-108). The transmitter has plural spaced apart antennas (208-212). The system further includes a data processor (604), a data input device (receiver, A/D) in communication with the data processor, an algorithmic software (606) directing the data processor, and a data storage unit (602). Discrete channel measurement data and discrete communication signal uplink data associated with the remote receiver in communication with the transmitter is stored and supplied to the data processor such that the data processor, directed by the algorithmic software, can automatically derive communication signal parameters using algorithmically defined relationships associated with the discrete channel measurement data. Thus, derived communication signals communicated between the transmitter and each respective antenna will be characterized by at least one distinct signal parameter selected from the group consisting of signal phase and signal amplitude. The data processor is further directed by the algorithmic software such that it can automatically determine signal path profile parameters (302-306) using algorithmically defined relationships associated with discrete communication signal uplink data such that a signal communicated between the transmitter and each antenna will be characterized by a distinct signal delay.

Independent claim 32 is directed to a communication system (Figures 2-3) including a transmitter (200) having plural spaced apart antennas (208-212). The system includes signal distributing means (250-254) for coupling communication signals between a transmitter and the plurality of spaced apart antennas. The system further includes signal deriving means (256) operatively coupled to the signal distributing means for providing communication signal phase parameters associated with communication signals. The phase parameters are determined from channel measurement information associated with the signal distributing means. A variable

delaying means (214-230) is operatively coupled to the plurality of spaced apart antennas and the signal distribution means for providing discrete delays associated with profile path estimates (302-306) of the communication signals and the plurality of spaced apart antennas.

Independent claim 37 is directed to a method of communicating data between a transmitter (Figures 2-3) having a plural antennas and at least one remote receiver (104-108). The method includes selectively amplitude scaling (214-230) data communication signals produced at the transmitter to generate derived versions of the data communication signals. The transmitter transmits the derived versions of each data communication signal to each antenna of the plural antennas. A distinct delay (214-230) associated with each derived version of the data communication signal and its respective antenna is applied to the communication signal. The distinct delay associated with a derived version of the data communication signal and its respective antenna is altered if and when an estimated path profile (302-306) associated with a communication channel changes from a prior estimated path profile.

Independent claim 42 is directed to a data communication system (Figures 2-3) including a transmitter (200) having a plural spaced apart antennas (208-212) suitable for communication with a remote receiver (104-108). The system includes a phase shifting element (232-248) providing a derived version of a communication signal transmitted from a transmitter channel (202-206) to the plural spaced apart antennas. The system further includes a delay element (214-230) providing a distinct delay associated with each antenna in response to a path profile estimate (302-306) of a signal from the remote receiver.

Independent claim 45 is directed to a data communication system (Figures 2-3) including a transmitter (200) having plural spaced apart antennas (208-212) suitable for communication with a remote receiver (104-108). The system includes a multiplier element (232-248) providing a derived version of a communication signal transmitted from a transmitter channel (202-206) to the plural spaced apart antennas. The multiplier element is configured to amplitude scale the communication signal. A delay element (214-230) provides a distinct delay associated with each antenna in response to a path profile estimate (302-306) of a signal from the remote receiver.

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6. GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL

A. Claims 1-4, 6-11, 28-38, and 40-47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rashid-Farrokhi et al. (U.S. Pat. No. 6,400,780) in view of Reudink (U.S. Pat. No. 5,648,968).

B. Claims 12-14, 17-19, and 22 are rejected under 35 U.S.C. § 102(b) as being anticipated by Reudink (U.S. Pat. No. 5,648,968).

7. ARGUMENT

Independent claims 1, 8, 28, 32, 37, 42, and 45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rashid-Farrokhi et al. (U.S. Pat. No. 6,400,780) in view of Reudink (U.S. Pat. No. 5,648,968). Independent claims 12 and 18 are rejected under 35 U.S.C. § 102(b) as being anticipated by Reudink (U.S. Pat. No. 5,648,968). Each independent claim recites a distinct delay based on a path profile. This distinct delay at each respective transmit antenna provides improved delay diversity over systems of the prior art. Referring to Figure 3 and page 12, line 14 of the instant specification, "the base station can measure the delay profile 302, 304, 306 in the uplink transmission from a mobile terminal 104, 106, 108 to implement one method of choosing delays 214-230 associated with multiple antennas 208-212 according to one embodiment of the present invention." Although Figure 3 identifies 302, 304, 306 as path profile estimation circuits as in the independent claims, path profile and delay profile have the same meaning within the specification.

A significant advantage of the present invention over the prior art is readily understood with reference to Figures 4-5 and page 13, lines 3-19 of the instant specification. Figure 5 shows an exemplary signal delay profile as received at a mobile terminal without the advantage of the present invention. The delay profile has a 1-chip delay between a signal transmitted from antenna 1 and from antenna 2. The primary signal from each antenna is indicated as 0 dB. A secondary multipath signal from each antenna is indicated as -10 dB. With the 1-chip delay it is seen that

the secondary multipath signal (-10 dB) from antenna 1 is masked by the primary signal (0 dB) from antenna 2. Thus, the delay profile at Figure 5 only provides 3-path diversity at the mobile receiver. Figure 4 shows an exemplary signal delay profile as received at a mobile terminal according to the present invention. The delay profile has a 2-chip delay between a signal transmitted from antenna 1 and from antenna 2. The primary signal from each antenna is indicated as 0 dB. A secondary multipath signal from each antenna is indicated as -10 dB. With the 2-chip delay, there is no masking or overlap from signals of different antennas. Thus, the present invention advantageously provides a full 4-path diversity.

Examiner, in a final rejection of October 16, 2006, and an advisory action of April 25, 2007, does not find these features in any of the cited references. Regarding Reudink, examiner states "the patent clearly describes that the delay is controllable by data maintained on the relative strengths which depends on changes in the incoming signals." (Office Action of 10/16/2006, page 2, last paragraph). Examiner reiterates this position in the advisory action. Therein, examiner states "the claims that simply recites 'path profile' is not just limited to the exemplary measurement characteristics since the claims must be given their broadest reasonable interpretation. Since signal strength is part of the path profile, it is not believed that examiner's reading was beyond reasonable interpretation." (Advisory Action of 4/25/2007, page 2, second paragraph). Appellants respectfully disagree for the following reasons.

First, examiner errs in claim interpretation. The term "path profile" must be interpreted in view of the specification. Moreover, the interpretation must be reasonable. Referring back to the previous explanation of Figures 4-5, is evident that signal strength would not afford advantages of the present invention. In particular, it would not matter whether the secondary multipath signal from antenna 1 were -10 dB, -8 dB, or -5 dB. The primary signal (0 dB) from antenna 2 would still overlap. There would still be only 3-path diversity. Likewise, there is no reason to believe received signal strength at the base station would serve the purpose of the present invention.

Second, examiner errs in stating "the signal strength is part of a path profile." (Advisory Action of 4/25/2007, page 2, second paragraph). Examiner offers no disclosure in any cited

reference that would equate "signal strength" with "path profile" or "delay profile." This is merely examiner's unsupported conclusion. It is neither taught nor suggested by any of the cited references. Moreover, it is a completely different interpretation than presented in the instant specification.

Third, examiner errs in combining the disclosure of Rashid-Farrokhi et al. with the disclosure of Reudink. Reudink discloses beam forming with angular diversity. This is completely different than the space-time diversity scheme disclosed by Rashid-Farrokhi et al. This is also a completely different purpose than the claimed invention. There is no disclosure and no reason to believe that "path profile" of the present invention might be interchangeable with "relative strengths" of Reudink. Such a substitution might render both inventions inoperative.

Finally, none of the cited references, taken alone or in combination, teach or suggest selecting distinct delays for transmitted signals based on a path profile of a received signal as required by each independent claim. Examiner errs in omitting this limitation from the claim interpretation process.

For all the foregoing reasons, therefore, independent claims 1, 8, 28, 32, 37, 42, and 45 and their respective depending claims are patentable under 35 U.S.C. § 103(a) over Rashid-Farrokhi et al. (U.S. Pat. No. 6,400,780) in view of Reudink (U.S. Pat. No. 5,648,968). Likewise, independent claims 12 and 18 and their respective depending claims are patentable under 35 U.S.C. § 102(b) over Reudink (U.S. Pat. No. 5,648,968).

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8. CLAIMS APPENDIX

1. A method of communicating data between a transmitter having a plurality of antennas and at least one remote receiver, the method comprising the steps of:

phase shifting a plurality of data communication signals from a respective plurality of channels to generate derived versions of each data communication signal, each derived version of each data communication signal having a respective signal phase shift;

transmitting the derived versions of each data communication signal to respective antennas within the plurality of antennas;

providing a distinct delay associated with each derived version of each data communication signal and its respective antenna; and

altering the distinct delay associated with a derived version of a data communication signal in response to a change of an estimated path profile associated with a channel of the plurality of channels.

2. The method according to claim 1 further comprising the step of receiving at the transmitter, data communication uplink signals from each remote receiver in communication with the transmitter and estimating a path profile associated with each received uplink signal.

3. The method according to claim 2 further comprising the step of determining a distinct communication signal delay associated with each channel of the plurality of channels, wherein each communication signal delay is derived from data associated with the respective uplink signal.

4. The method according to claim 1 further comprising the step of amplitude scaling the plurality of data communication signals such that each derived version of each data communication signal will further have a respective signal amplitude.

5. (Cancelled)

PAGE 10/19 * RCVD AT 6/25/2007 8:16:40 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/7 * DNIS:2738300 * CSID:7197830990 * DURATION (mm-ss):07-06

6. The method according to claim 1 wherein the derived versions of a data communication signal transmitted to each antenna are associated with a code division multiple access (CDMA) data signal.

7. The method according to claim 1 wherein the derived versions of a data communication signal transmitted to each antenna are associated with a time division multiple access (TDMA) data signal.

8. A method for communicating data between a transmitter having a plurality of antennas and at least one remote receiver, the method comprising the steps of:

receiving at the transmitter, data communication uplink signals from each remote receiver in communication with the transmitter and estimating a path profile associated with each received uplink signal;

determining a distinct communication signal delay associated with each communication channel within a plurality of communication channels, wherein each communication channel signal delay is derived from the estimated path profile of data associated with the respective uplink signal;

transmitting from the transmitter, a communication signal via each communication channel to each antenna within the plurality of antennas;

providing a distinct delay associated with each communication channel and its respective antenna;

measuring channel information between the transmitter and the plurality of antennas, the channel information selected from the group consisting of signal amplitude, signal phase and signal delay;

determining a desired communication signal phase shift associated with each communication channel from the measured channel information; and

selectively phase shifting communication signals produced at the transmitter to generate derived versions of channel communication signals, each derived version of the channel communication signals having its desired communication signal phase shift.

9. The method according to claim 8 further comprising the step of altering the distinct delay associated with a channel communication signal and its respective antenna if and when the estimated path profile associated with the specific channel communication signal changes from its prior estimated path profile.

10. The method according to claim 8 wherein the step of receiving at the transmitter, a communication uplink signal from each remote receiver in communication with the transmitter and estimating a path profile associated with each received uplink signal comprises the step of receiving a time division multiple access (TDMA) data signal.

11. The method according to claim 8 wherein the step of receiving at the transmitter, a communication uplink signal from each remote receiver in communication with the transmitter and estimating a path profile associated with each received uplink signal comprises the step of receiving a code division multiple access (CDMA) data signal.

12. A communication system comprising:

a transmitter having a plurality of spaced apart antennas;

a channel measurement circuit coupled to the plurality of spaced apart antennas and arranged to produce a path profile estimate in response to a signal from a remote transmitter;

a channel input terminal coupled to receive a data communication signal; and

a delay circuit operatively coupled between the channel input terminal and the plurality of spaced apart antennas providing a distinct delay in the data communication signal in response to the path profile estimate.

13. The communication system according to claim 12 wherein the data communication signal is associated with a code division multiple access (CDMA) data signal.

14. The communication system according to claim 12 wherein the data communication signal is associated with a time division multiple access (TDMA) data signal.

15. The communication system according to claim 12 wherein the channel measurement circuit is configured to phase shift the data communication signal.

16. The communication system according to claim 15 wherein the channel measurement circuit is further configured to amplitude scale the data communication signal.

17. The communication system according to claim 12 wherein the channel measurement circuit is configured to amplitude scale the data communication signal.

18. A data communication system comprising:

a transmitter having a plurality of spaced apart antennas suitable for communication with at least one remote receiver;

an element providing a derived version of each communication signal transmitted from a transmitter channel to the plurality of spaced apart antennas; and

a delay element providing a distinct delay associated with each antenna and configured to alter the distinct delay in response to a change of a path profile associated with the transmitter channel.

19. The data communication system according to claim 18 wherein the delay element provides the distinct delay to a code division multiple access (CDMA) communication signal.

20. The data communication system according to claim 18 wherein the delay element provides the distinct delay to a time division multiple access (TDMA) communication signal coupled between the transmitter and the plurality of spaced apart antennas can be demodulated within the at least one remote receiver.

21. The data communication system according to claim 18 wherein the element providing a derived version of each communication signal is configured to phase shift a communication signal transmitted from a transmitter channel to the plurality of spaced apart antennas.

22. The data communication system according to claim 18 wherein the element providing a derived version of each communication signal is further configured to amplitude scale a communication signal transmitted from a transmitter channel to the plurality of spaced apart antennas.

23-27. (Cancelled)

28. A data communication system comprising:

a transmitter configured to communicate with at least one remote receiver, the transmitter having a plurality of spaced apart antennas and further having:

a data processor;

a data input device in communication with the data processor;

an algorithmic software directing the data processor; and

a data storage unit, wherein discrete channel measurement data and discrete communication signal uplink data associated with at least one remote receiver in communication with the transmitter is stored and supplied to the data processor such that the data processor, directed by the algorithmic software, can automatically derive communication signal parameters using algorithmically defined relationships associated with the discrete channel measurement data such that derived communication signals communicated between the transmitter and each respective antenna will be characterized by at least one distinct signal parameter selected from the group consisting of signal phase and signal amplitude; and further wherein the data processor is further directed by the algorithmic software such that it can automatically determine signal path profile parameters using algorithmically defined relationships associated with discrete communication signal uplink data such that a signal communicated between the transmitter and each antenna will be characterized by a distinct signal delay.

29. The data communication system according to claim 28 further comprising at least one remote receiver.

30. The data communication system according to claim 29 wherein the at least one remote receiver is configured to demodulate a time division multiple access (TDMA) signal generated by the transmitter.

31. The data communication system according to claim 29 wherein the at least one remote receiver is configured to demodulate a code division multiple access (CDMA) signal generated by the transmitter.

32. A communication system in which system users communicate information signals through a transmitter, the transmitter having an antenna system comprising:

a plurality of spaced apart antennas;

signal distributing means for coupling communication signals between a transmitter and the plurality of spaced apart antennas;

signal deriving means operatively coupled to the signal distributing means for providing communication signal phase parameters associated with communication signals, wherein the phase parameters are determined from channel measurement information associated with the signal distributing means; and

variable delaying means operatively coupled to the plurality of spaced apart antennas and the signal distribution means for providing discrete delays associated with profile path estimates of the communication signals and the plurality of spaced apart antennas.

33. The communication system according to claim 32 wherein the variable delaying means comprises:

a data processor;

an algorithmic software directing the data processor; and

a data storage unit, wherein discrete signal uplink data associated with at least one mobile terminal in communication with the transmitter is stored and supplied to the data processor such that the data processor, directed by the algorithmic software, can automatically determine signal path profile parameters using algorithmically defined relationships associated with the discrete

signal uplink data such that a signal communicated between the transmitter and each antenna will be characterized by a signal delay distinct to each antenna.

34. The communication system according to claim 33 wherein the algorithmic software is configured to further direct the data processor such that the data processor can determine new signal path profile parameters to re-characterize the signal delay distinct to each antenna when the discrete signal uplink data received by the transmitter are sufficiently changed to require that a distinct signal delay change by at least one chip from an existing distinct signal delay.

35. The communication system according to claim 32 wherein the communication signals are associated with code division multiple access (CDMA) data.

36. The communication system according to claim 32 wherein the communication signals are associated with time division multiple access (TDMA) data.

37. A method of communicating data between a transmitter having a plurality of antennas and at least one remote receiver, the method comprising the steps of:

selectively amplitude scaling data communication signals produced at the transmitter to generate derived versions of the data communication signals, each derived version of the data communication signals having a respective signal amplitude;

transmitting from the transmitter, derived versions of each data communication signal to each antenna within the plurality of antennas;

providing a distinct delay associated with each derived version of the data communication signal and its respective antenna; and

altering the distinct delay associated with a derived version of the data communication signal and its respective antenna if and when an estimated path profile associated with a communication channel changes from a prior estimated path profile.

38. The method according to claim 37 further comprising the step of selectively phase shifting data communication signals produced at the transmitter such that each derived version of the data communication signals will further have a respective signal phase shift.

39. (Cancelled)

40. The method according to claim 37 wherein the derived versions of a data communication signal transmitted to each antenna are associated with a code division multiple access (CDMA) data signal.

41. The method according to claim 37 wherein the derived versions of a data communication signal transmitted to each antenna are associated with a time division multiple access (TDMA) data signal.

42. A data communication system comprising:

a transmitter having a plurality of spaced apart antennas suitable for communication with at least one remote receiver;

a phase shifting element providing a derived version of a communication signal transmitted from a transmitter channel to the plurality of spaced apart antennas, wherein the phase shifting element is configured to phase shift the communication signal; and

a delay element providing a distinct delay associated with each antenna in response to a path profile estimate of a signal from the at least one remote receiver.

43. The data communication system according to claim 42 wherein the delay element provides the distinct delay to a code division multiple access (CDMA) communication signal.

44. The data communication system according to claim 42 wherein the delay element provides the distinct delay to a time division multiple access (TDMA) communication signal.

45. A data communication system comprising:

a transmitter having a plurality of spaced apart antennas suitable for communication with at least one remote receiver;

a multiplier element providing a derived version of a communication signal transmitted from a transmitter channel to the plurality of spaced apart antennas, wherein the multiplier element is configured to amplitude scale the communication signal; and

a delay element providing a distinct delay associated with each antenna in response to a path profile estimate of a signal from the at least one remote receiver.

46. The data communication system according to claim 45 wherein the delay element provides the distinct delay to a code division multiple access (CDMA) communication signal.

47. The data communication system according to claim 45 wherein the delay element provides the distinct delay to a time division multiple access (TDMA) communication signal.

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9. EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS APPENDIX

None.

Respectfully submitted,

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